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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,190	09/16/2003	Fuyong Zhao	50325-0803	5579

29989 7590 04/02/2008

HICKMAN PALERMO TRUONG & BECKER, LLP
2055 GATEWAY PLACE
SUITE 550
SAN JOSE, CA 95110

EXAMINER	
SINKANTARAKORN, PAWARIS	

ART UNIT	PAPER NUMBER
2616	

MAIL DATE	DELIVERY MODE
04/02/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/665,190	ZHAO, FUYONG	
	Examiner	Art Unit	
	PAO SINKANTARAKORN	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 January 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *5 and 6* is/are allowed.

6)☒ Claim(s) *1-4 and 7-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/24/2008 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

3. On page 4 of the Remarks, the Applicant submits that claims 5, 7, 10, 14, and 18 each recite similar features as claim 1. However, claim 7 fails to recite the limitation "wherein a first set of routers that are on said least-delay path is in a pheromone table on the first router, and wherein a second set of routers that have been visited by said first data packet is indicated in said first data packet." For the purpose of examination, the Examiner examines claim 7 as submitted without the limitation above.

4. Claims 1-21 are currently pending in the Application.

Claim Rejections - 35 USC § 103

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-4 and 10-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Di Caro et al. (newly cited NPL/AntNet: Distributed Stigmergetic Control for Communications Networks) in view of Matthews et al. (newly cited US 6,084,858).

Regarding claims 1, 10, 14, and 18, Di Caro et al. disclose a method of discovering a network path that satisfies a quality of service (QOS) requirement, the method comprising computer-implemented steps of:

receiving, at a first router, a first data packet that indicates a destination and the QOS requirement (see page 326 Algorithm step 1, a mobile agent (forward ant) is launched toward a destination node; therefore, a first node receives the mobile agent, wherein the mobile agent keeps the traffic conditions found in each visited node);

updating the first data packet to indicate an identity of the first router (see page 326 Algorithm step 2, the agent keeps memory of its path and push the identifier of every visited node k onto a memory stack at each visited node);

determining whether the first data packet has visited any router in the least-delay path other than the first router (see page 327 Algorithm step 2, each agent chooses among the neighbors it did not already visit; therefore, it determines whether the agent has visited any router in the path);

wherein a first set of routers that are on the least-delay path is in a pheromone table on the first router (see page 326 Algorithm step 2, the identifier of every visited node k and the time elapsed are pushed onto a memory stack, wherein the memory stack corresponds to the pheromone table), and wherein a second set of routers that have been visited by the first data packet is indicated in the first data packet (see page 326 Algorithm step 2, the agent keeps memory of its path and push the memory of its path onto a memory stack at each visited node);

if the first data packet has not visited any router in the least-delay path other than the first router, then sending the first data packet to a second router in the least-delay path (see page 327 Algorithm step 2, each agent chooses among the neighbors it did not already visit, then it moves to the neighbors it did not already visit); and

receiving, at the first router, a second data packet that indicates a path taken the first data packet to the destination (see page 328 Algorithm steps 6 and 7, the backward ant updates the local model of the traffic and the routing table when it arrives at node k).

Di Caro et al. fail to disclose a method of determining whether a least-delay path from the first router to the destination satisfies the QOS requirement. However, Matthews et al. from the same or similar fields of endeavor disclose a method of determining whether a least-delay path from the first router to the destination satisfies the QOS requirement (see column 4 lines 44-65 and column 5 lines 54-64).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to implement a method of determining whether a least-delay path from the first router to the destination satisfies the QOS requirement as taught by Matthews et al. into the method of Di Caro et al.

The motivation for implementing the method of determining whether a least-delay path from the first router to the destination satisfies the QOS requirement is that it increases the speed and reliability of the routing method.

regarding claims 2, 11, 15, and 19, the first router has links, and further comprising:

if the least-delay path does not satisfy the QOS requirement, then performing steps comprising:

determining one or more of the first router's links that satisfy the QOS requirement (see page 327 Algorithm step 3); and

sending a copy of the first data packet through the one or more of the first router's link that satisfy the QOS requirement (see page 327 Algorithm step 3);

regarding claims 3, 12, 16, and 20, the first router has links, and further comprising:

if the first data packet has visited a router in the least-delay path other than the first router, then performing steps comprising:

determining one or more of the first router's links that satisfy the QOS requirement(see page 327 Algorithm step 3); and

sending a copy of the first data packet through the one or more of the first router's link that satisfy the QOS requirement (see page 327 Algorithm step 3);

regarding claims 4, 13, 17, and 21, in response to receiving the first data packet, updating a table to indicate that the first router has received a copy of the first data packet (see page 326 Algorithm step 2).

9. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cain et al. (US 2003/0202468) in view of Di Caro et al. (newly cited NPL/AntNet: Distributed Stigmergetic Control for Communications Networks).

Regarding claim 7, Cain et al. disclose a method of discovering a least-cost network path, the method comprising computer-implemented steps of:

receiving, at a first router, a first data packet that indicates a destination (see paragraph 43, the source node transmits a QOS route request to discover paths to the destination node based upon a QOS parameter);

updating the first data packet to indicate an identity of the first router (see paragraph 44, the intermediate node updates the QOS link metric and temporarily reserves node resources for that QOS route request);

if the first data packet has not visited any router in the least-cost path other than the first router, then sending the first data packet to a second router in the least-cost path (see paragraphs 44, 45, 69, and 70, once the intermediate node 3 receives the QOS route request from the source node 1, it determines whether the intermediate node 3 can support the requested QOS parameter and whether the packet has visited any router in the path other than the intermediate node 3, wherein the QOS link metric indicates whether the packet has visited any other router by determining whether the QOS link metric has been updated, then it forwards the packet to other intermediate nodes 2 and 5; the intermediate nodes 2 and 5 do the same and forward the packet to the destination node 4; QOS parameter is preferably based upon available bandwidth, error rate, delay, etc.; therefore, 1-3-5-4 route can be least-cost path);

if the first data packet has visited a router in the least-cost path other than the first router, then sending the first data packet to a third router in a first least-delay path from the first router to the destination (see paragraphs 44, 45, 69, and 70, once the intermediate node 3 receives the QOS route request from the source node 1, it determines whether the intermediate node 3 can support the requested QOS parameter

and whether the packet has visited any router in the path other than the intermediate node 3, wherein the QOS link metric indicates whether the packet has visited any other router by determining whether the QOS link metric has been updated, then it forwards the packet to other intermediate nodes 2 and 5; the intermediate nodes 2 and 5 do the same and forward the packet to the destination node 4; QOS parameter is preferably based upon available bandwidth, error rate, and/or delay, etc.; therefore, 1-3-5-4 route can be least-cost path); and

receiving, at the first router, a second data packet that indicates a path taken by the first data packet to the destination (see paragraphs 44, 45, 69, and 70, once the intermediate node 3 receives the QOS route request from the source node 1, it determines whether the intermediate node 3 can support the requested QOS parameter and whether the packet has visited any router in the path other than the intermediate node 3, wherein the QOS link metric indicates whether the packet has visited any other router by determining whether the QOS link metric has been updated, then it forwards the packet to other intermediate nodes 2 and 5; the intermediate nodes 2 and 5 do the same and forward the packet to the destination node 4; QOS parameter is preferably based upon available bandwidth, error rate, and/or delay, etc.; therefore, 1-2-4 route can be least-delay path);

wherein the least-cost path differs from the first least-delay path (see Fig 1 and paragraph 45, 1-2-4 and 1-3-5-4 are two different paths).

Cain et al. disclose all the subject matter of the claimed invention except a method of determining whether the first data packet has visited any router in a least-

cost path from the first router to the destination, not including the first router. However, Di Caro et al. from the same or similar fields of endeavor disclose a method of determining whether the first data packet has visited any router in a least-cost path from the first router to the destination, not including the first router (see page 327 Algorithm step 2, each agent chooses among the neighbors it did not already visit; therefore, it determines whether the agent has visited any router in the path).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to implement the page 327 Algorithm step 2, each agent chooses among the neighbors it did not already visit; therefore, it determines whether the agent has visited any router in the path as taught by Di Caro et al. into the method of Cain et al.

The motivation for implementing the page 327 Algorithm step 2, each agent chooses among the neighbors it did not already visit; therefore, it determines whether the agent has visited any router in the path is that it increases the speed and efficiency of the route discovery system.

regarding claim 8, Cain et al. disclose a method further comprising:

receiving, at the second router, the first data packet (see paragraphs 67-70, a source node broadcasts the QOS route request to the destination node);

determining whether a second least-delay path from the second router to the destination satisfies a delay requirement indicated by the first data packet (see paragraphs 68, the source node broadcasts, which means all the paths are being

determined whether the paths satisfy the delay requirement requested by the source node);

if the second least-delay path does not satisfy the delay requirement, then performing steps comprising:

updating the first data packet to indicate a wrong way (see paragraph 73, the updating is done by discarding the QOS route request and generate a route error to send back to the source node to notify that there is a link failure along the path); and

sending the first data packet to the first router (see paragraphs 67 and 73, if the requested QOS requirement cannot be satisfied, a route error packet is generated and return to the source node)

regarding claim 9, further comprising:

receiving at the first router, the first data packet (see paragraphs 67 and 73, the route error packet is returned to the source node via the reverse path through intermediate nodes);

determining whether the first data packet indicates a wrong way (see paragraph 73, the route error packet indicates a wrong way);

if the first data packet indicates a wrong way, then performing the steps comprising:

updating the first data packet to not indicate a wrong way (see paragraphs 67, 68, and 73, the source node broadcast a new QOS route request packet to the destination node, which does not indicate a wrong way); and

sending the first data packet to the third router (see paragraphs 67, 68, and 73, the source node broadcasts a new QOS route request packet to all the intermediate nodes connected to the source node including the intermediate node 3).

Allowable Subject Matter

10. Claims 5 and 6 are allowed.

11. The following is an examiner's statement of reasons for allowance:

The closest reference, Di Caro et al., teach a method of discovering a least-delay path using AntNet algorithm (see pages 326-330), wherein a forward mobile agent is sent toward a destination node to investigate the load status of the network. The agent keeps memory of their paths and the traffic conditions of every visited node (see page 326). Each agent headed towards its destination selects the neighbor nodes it did not already visit to move to (see page 327). When the agent reaches destination, it generates a backward agent and transfers all of the memory to it, then the backward agent travels back to the source along the path traveled by the forward agent (see pages 327-328). Along the path, the backward agent updates the local model of the traffic and the routing table at every visited node (see page 328).

However, regarding claims 5 and 6, Di Caro et al. fail to teach the claimed features of:

if the data packet indicates that a path to the destination has been found, and if the least-delay path from the first router to the destination does not satisfy the QOS requirement, then eliminating the data packet; and

if the data packet does not indicate that a path to the destination has been found, and if the least-delay path from the first router to the destination satisfies the QOS requirement, then performing steps comprising:

updating the data packet to indicate that a path to the destination has been found; and

sending the data packet through the link that leads to the second router on the least-delay path.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Huang et al. (US 2003/0202479) is cited to show system/method considered pertinent to the claimed invention.

13. **Examiner's Note**: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAO SINKANTARAKORN whose telephone number is (571)270-1424. The examiner can normally be reached on Monday-Thursday 9:00am-3:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on 571-272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ricky Ngo/
Supervisory Patent Examiner, Art Unit 2616

PS